CLAIMS

What is claimed is:

1. A method for underfilling a semiconductor device assembly comprising at least one semiconductor device conductively mounted on a carrier substrate in spaced relationship thereto, comprising:

securing the carrier substrate to a tiltable support with the at least one semiconductor device above the carrier substrate;

tilting the tiltable support to orient the carrier substrate at a nonhorizontal angle;

progressively immersing the oriented carrier substrate and the at least one semiconductor device in a reservoir of photopolymerizable liquid resin to cause the liquid resin to flow between the carrier substrate and the at least one semiconductor device;

reorienting the carrier substrate to a substantially horizontal attitude and to a selected depth within the liquid resin; and

exposing selected portions of the liquid resin over the carrier substrate and adjacent a lateral periphery of the at least one semiconductor device on the carrier substrate to a directed radiation beam to initiate polymerization of the liquid resin and form at least a semisolid peripheral dam structure about the at least one semiconductor device with a pool of the liquid resin lying within the dam structure and between the at least one semiconductor device and the carrier substrate.

2. The method of claim 1, further comprising subjecting the dam structure and the pool of the liquid resin to a post polymerization process to cure the dam structure and the liquid resin trapped thereby to a solid state to form a unitary structure.

3. The method of claim 1, further comprising securing the at least one semiconductor device to the carrier substrate using a plurality of mutually laterally spaced conductive elements.

4. The method of claim 1, further comprising tilting the carrier substrate to an angle with the horizontal of between about 10 and about 90 degrees.

5. The method of claim 1, further comprising tilting the carrier substrate to an angle with the horizontal of between about 30 and about 60 degrees.

6. The method of claim 1, further comprising vibrating the carrier substrate during the immersion of the carrier substrate and the at least one semiconductor device.

7. The method of claim 1, further comprising vibrating the liquid resin during the immersion of the carrier substrate and the at least one semiconductor device.

8. The method of claim 1, further comprising selecting the liquid resin to be a photopolymerizable resin having a viscosity less than about 200 centipoise.

9. The method of claim 1, further comprising submerging the carrier substrate in the liquid resin to a greater depth than a height of the dam structure and exposing selected portions of the liquid resin over the dam structure and adjacent the lateral periphery of the at least one semiconductor device on the carrier substrate to the directed radiation beam to initiate the polymerization of the liquid resin to at least a semisolid state and increase the height of the dam structure.

10. The method of claim 9, further comprising adhering the dam structure to the lateral periphery of the at least one semiconductor device on the carrier substrate.

11. The method of claim 9, further comprising trapping the pool of the liquid resin between the at least one semiconductor device, the carrier substrate and the dam structure.

12. The method of claim 1, further comprising adhering the dam structure to the lateral periphery of the at least one semiconductor device on the carrier substrate.

13. The method of claim 1, further comprising trapping the pool of the liquid resin between the at least one semiconductor device, the carrier substrate and the dam structure.

14. The method of claim 1, further comprising forming the dam structure to a height at least as great as a height of the at least one semiconductor device above the carrier substrate.

15. The method of claim 14, further comprising submerging the carrier substrate to a depth wherein the liquid resin overlies the at least one semiconductor device and exposing the liquid resin over the at least one semiconductor device to radiation to initiate polymerization of the liquid resin and form at least a semisolid layer over the at least one semiconductor device.